

БАЗЫ ДАННЫХ

Лекция 5
Оператор SELECT

Оператор SELECT

- Основная инструкция для выборки информации — инструкция SELECT
- Результаты выполнения инструкции SELECT помещаются в **результатирующий набор** (result set)

```
drop table AUDITORIUM_TYPE  
create table AUDITORIUM_TYPE  
(  
  AUDITORIUM_TYPE      char(10) primary key, -- код типа аудитории  
  AUDITORIUM_TYPENAME  varchar(30)          -- тип аудитории  
)
```

```
drop table AUDITORIUM  
create table AUDITORIUM  
(  
  AUDITORIUM           char(10) primary key, -- код аудитории  
  AUDITORIUM_NAME      varchar(200),         -- аудитория  
  AUDITORIUM_CAPACITY  integer,             -- вместимость  
  AUDITORIUM_TYPE      char(10) not null     -- тип аудитории  
  references AUDITORIUM_TYPE (AUDITORIUM_TYPE)  
)
```

AUDITORIUM_TYPE

	Имя столбца	Сжатый тип	Допускает значения NULL	Тип данных
🔑	AUDITORIUM_TYPE	char(10)	Нет	char(10)
	AUDITORIUM_TYPENAME	varchar(30)	Да	varchar(30)



AUDITORIUM *

	Имя столбца	Сжатый тип	Допускает значения NULL	Тип данных
🔑	AUDITORIUM	char(10)	Нет	char(10)
	AUDITORIUM_NAME	varchar(2...	Да	varchar(2...
	AUDITORIUM_CA...	int	Да	int
	AUDITORIUM_TYPE	char(10)	Нет	char(10)

```
delete AUDITORIUM_TYPE;
insert into AUDITORIUM_TYPE (AUDITORIUM_TYPE, AUDITORIUM_TYPENAME )
      values ('ЛК', 'Лекционная');
insert into AUDITORIUM_TYPE (AUDITORIUM_TYPE, AUDITORIUM_TYPENAME )
      values ('ЛБ-К', 'Компьютерный класс');
insert into AUDITORIUM_TYPE (AUDITORIUM_TYPE, AUDITORIUM_TYPENAME )
      values ('ЛК-К', 'Лекционная с уст. компьютерами');
insert into AUDITORIUM_TYPE (AUDITORIUM_TYPE, AUDITORIUM_TYPENAME )
      values ('ЛБ-Х', 'Химическая лаборатория');
insert into AUDITORIUM_TYPE (AUDITORIUM_TYPE, AUDITORIUM_TYPENAME )
      values ('ЛБ-СК', 'Спец. компьютерный класс');
```

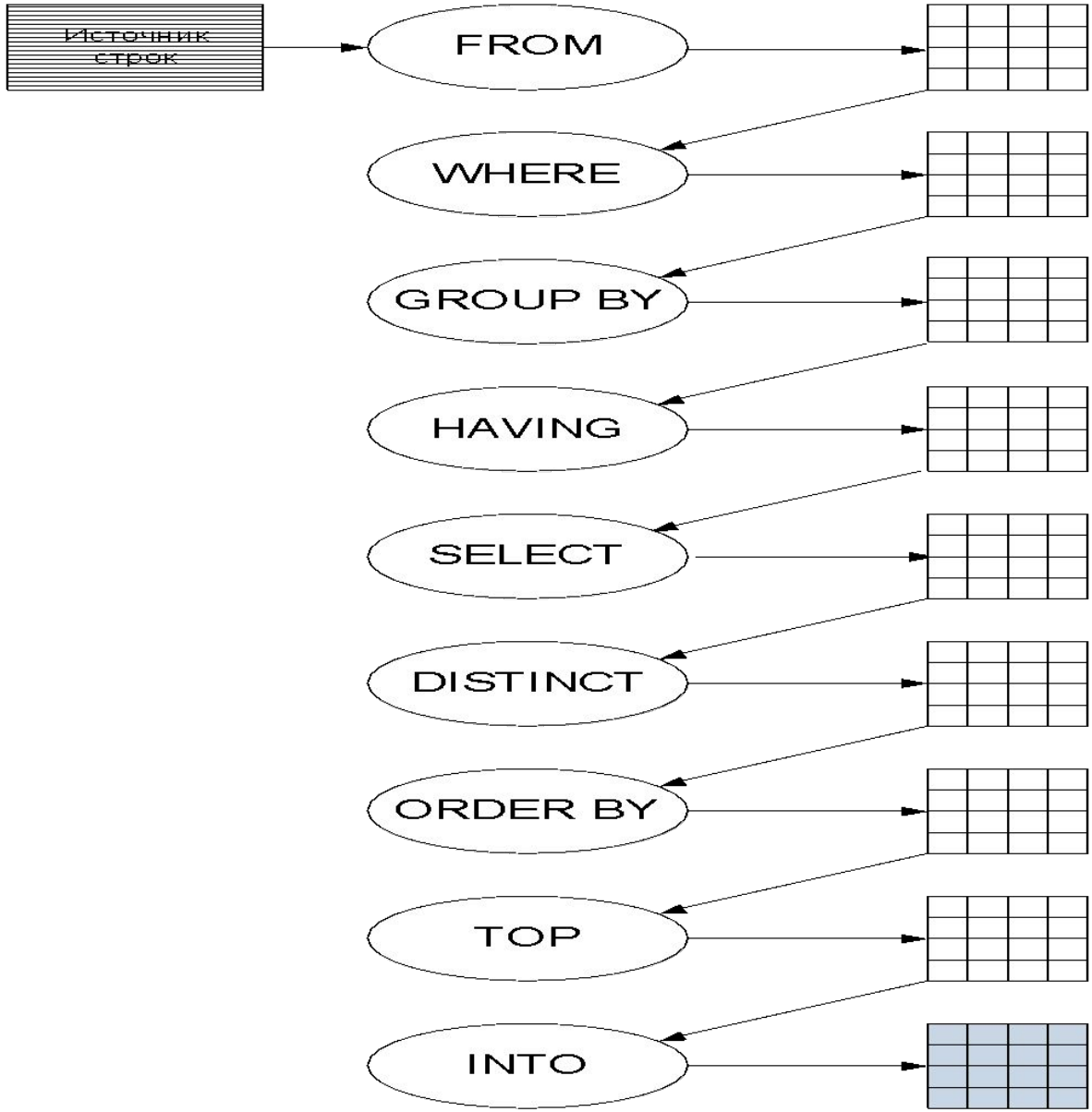
```

delete AUDITORIUM;
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('206-1', '206-1', 'JB-K', 15);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY)
values ('301-1', '301-1', 'JB-K', 15);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('236-1', '236-1', 'JK', 60);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('313-1', '313-1', 'JK', 60);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('324-1', '324-1', 'JK', 50);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('413-1', '413-1', 'JB-K', 15);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('423-1', '423-1', 'JB-K', 90);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('408-2', '408-2', 'JK', 90);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('103-4', '103-4', 'JK', 90);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('105-4', '105-4', 'JK', 90);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('107-4', '107-4', 'JK', 90);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('110-4', '110-4', 'JK', 30);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('111-4', '111-4', 'JK', 30);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('114-4', '114-4', 'JK-K', 90 );
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('132-4', '132-4', 'JK', 90);
insert into AUDITORIUM (AUDITORIUM, AUDITORIUM_NAME, AUDITORIUM_TYPE, AUDITORIUM_CAPACITY )
values ('02B-4', '02B-4', 'JK', 90);

```


Синтаксис

```
SELECT select_list
    [INTO new_table]
FROM table
    [WHERE search_condition]
    [GROUP BY group_by_expression]
    [HAVING search_condition]
    [ORDER BY order_expression [ASC | DESC]];
```



FROM

```
SELECT 'HELLO, WORLD!';  
SELECT SYSDATETIME();
```



The screenshot shows a SQL query execution window with two result sets. The first result set has a column header '(No column name)' and a single row containing the text 'HELLO, WORLD!'. The second result set also has a column header '(No column name)' and a single row containing the timestamp '2017-03-04 00:27:45.9913489'. The window includes a toolbar with a back arrow and a 'Messages' tab.

(No column name)
HELLO, WORLD!

(No column name)
2017-03-04 00:27:45.9913489

FROM

```
SELECT * FROM AUDITORIUM;
```

```
SELECT AUDITORIUM, AUDITORIUM_CAPACITY FROM AUDITORIUM;
```

100 %

Results Messages

	AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
1	103-4	ЛК	90	103-4
2	105-4	ЛК	90	105-4
3	107-4	ЛК	90	107-4
4	110-4	ЛК	30	110-4
5	111-4	ЛК	30	111-4
6	114-4	ЛК-К	90	114-4
7	206-1	ЛБ-К	15	206-1
8	236-1	ЛК	60	236-1
9	301-1	ЛБ-К	15	301-1
10	313-1	ЛК-К	60	313-1
11	324-1	ЛК-К	50	324-1
12	408-2	ЛК	90	408-2
13	413-1	ЛБ-К	15	413-1
14	423-1	ЛБ-К	90	423-1

FROM

```
SELECT AUDITORIUM AS [Аудитория],  
       AUDITORIUM_CAPACITY AS [Вместимость]  
FROM AUDITORIUM;
```

00 %

Results Messages

	Аудитория	Вместимость
1	103-4	90
2	105-4	90
3	107-4	90
4	110-4	30
5	111-4	30
6	114-4	90
7	206-1	15
8	236-1	60
9	301-1	15
10	313-1	60
11	324-1	50
12	408-2	90
13	413-1	15
14	423-1	90

FROM

```
SELECT AUDITORIUM_TYPENAME FROM  
(SELECT * FROM AUDITORIUM_TYPE WHERE AUDITORIUM_TYPE = 'ЛК') as t1;
```

%

Results Messages

AUDITORIUM_TYPENAME
Лекционная

WHERE

```
select * from AUDITORIUM WHERE AUDITORIUM_CAPACITY < 60
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
110-4	110-4	30	ЛК
111-4	111-4	30	ЛК
206-1	206-1	15	ЛБ-К
301-1	301-1	15	ЛБ-К
324-1	324-1	50	ЛК
413-1	413-1	15	ЛБ-К

WHERE

```
select * from AUDITORIUM where AUDITORIUM_CAPACITY < 60 and  
AUDITORIUM_CAPACITY > 15
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
110-4	110-4	30	ЛК
111-4	111-4	30	ЛК
324-1	324-1	50	ЛК

WHERE

```
select * from AUDITORIUM where AUDITORIUM_CAPACITY < 60 or  
AUDITORIUM_CAPACITY > 15
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
025-4	025-4	90	ЛК
103-4	103-4	90	ЛК
105-4	105-4	90	ЛК
107-4	107-4	90	ЛК
110-4	110-4	30	ЛК
111-4	111-4	30	ЛК
114-4	114-4	90	ЛК-К
132-4	132-4	90	ЛК
206-1	206-1	15	ЛБ-К
229-4	229-4	90	ЛК
236-1	236-1	60	ЛК
301-1	301-1	15	ЛБ-К
304-4	304-4	90	ЛБ-К
313-1	313-1	60	ЛК
314-4	314-4	90	ЛК
320-4	320-4	90	ЛК
324-1	324-1	50	ЛК
408-2	408-2	90	ЛК
413-1	413-1	15	ЛБ-К
423-1	423-1	90	ЛБ-К
429-4	429-4	90	ЛК

WHERE

\neq (или \neq)	не равно
$<$	меньше чем
$>$	больше чем
\geq	больше чем или равно
\leq	меньше чем или равно
$!>$	не больше чем
$!<$	не меньше чем

WHERE

- Сравнение строк (CHAR, VARCHAR, NCHAR и NVARCHAR) выполняется в **действующем порядке сортировки**
- При сравнении строк сравниваются соответствующие символы каждой строки
- Старшинство символа определяется его позицией в кодовой таблице: символ, чей код стоит в таблице раньше, считается меньше
- При сравнении строк разной длины, более короткая строка дополняется в конце пробелами до длины более длинной строки

WHERE

The screenshot shows the SQL Server Enterprise Manager interface. The title bar indicates the server is '1-VAIO (SQL Server 11.0.2218 - 1-VAIO\1)'. The left sidebar shows a tree view with 'Server Properties' expanded. The main pane displays the 'Server Properties' dialog box for the '1-VAIO' server. The 'Server Collation' property is highlighted with a red box, showing the value 'Cyrillic_General_CI_AS'. Other properties include Name (1-VAIO), Product (Microsoft SQL Server Enterprise (64-bit)), Operating System (Microsoft Windows NT 6.1 (7601)), Platform (NT x64), Version (11.0.2218.0), Language (Английский (США)), Memory (4063 (MB)), Processors (2), Root Directory (c:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL), Is Clustered (False), and Is HADR Enabled (False).

Name	Value
Name	1-VAIO
Product	Microsoft SQL Server Enterprise (64-bit)
Operating System	Microsoft Windows NT 6.1 (7601)
Platform	NT x64
Version	11.0.2218.0
Language	Английский (США)
Memory	4063 (MB)
Processors	2
Root Directory	c:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL
Server Collation	Cyrillic_General_CI_AS
Is Clustered	False
Is HADR Enabled	False

- CI или CS
- AI или AS

WHERE

```
SELECT * FROM AUDITORIUM WHERE AUDITORIUM_TYPE > 'ЛК';
```

100 %

Results Messages

	AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
1	114-4	ЛК-К	90	114-4
2	313-1	ЛК-К	60	313-1
3	324-1	ЛК-К	50	324-1

WHERE

```
SELECT * FROM AUDITORIUM WHERE AUDITORIUM_TYPE >= 'ЛК';
```

0 %

Results Messages

	AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
1	103-4	ЛК	90	103-4
2	105-4	ЛК	90	105-4
3	107-4	ЛК	90	107-4
4	110-4	ЛК	30	110-4
5	111-4	ЛК	30	111-4
6	114-4	ЛК-К	90	114-4
7	236-1	ЛК	60	236-1
8	313-1	ЛК-К	60	313-1
9	324-1	ЛК-К	50	324-1
10	408-2	ЛК	90	408-2

WHERE

```
SELECT * FROM AUDITORIUM WHERE AUDITORIUM_TYPE > 'лк';
```

100 %

Results Messages

	AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
1	103-4	ЛК	90	103-4
2	105-4	ЛК	90	105-4
3	107-4	ЛК	90	107-4
4	110-4	ЛК	30	110-4
5	111-4	ЛК	30	111-4
6	114-4	ЛК-К	90	114-4
7	206-1	ЛБ-К	15	206-1
8	236-1	ЛК	60	236-1
9	301-1	ЛБ-К	15	301-1
10	313-1	ЛК-К	60	313-1
11	324-1	ЛК-К	50	324-1
12	408-2	ЛК	90	408-2
13	413-1	ЛБ-К	15	413-1
14	423-1	ЛБ-К	90	423-1

WHERE

- Приоритет выполнения:
 - оператор NOT
 - оператор AND
 - оператор OR

```
SELECT * FROM AUDITORIUM
WHERE AUDITORIUM_TYPE = 'ЛК' AND AUDITORIUM_CAPACITY = 30
OR
AUDITORIUM_CAPACITY = 90 | AND AUDITORIUM = '103-4';
```

%

Results Messages

AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
103-4	ЛК	90	103-4
110-4	ЛК	30	110-4
111-4	ЛК	30	111-4

```
SELECT * FROM AUDITORIUM
WHERE ((AUDITORIUM_TYPE = 'ЛК' AND AUDITORIUM_CAPACITY = 30 )
OR
AUDITORIUM_CAPACITY = 90 ) AND AUDITORIUM = '103-4';
```

%

Results Messages

AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
103-4	ЛК	90	103-4

WHERE NOT

```
select * from AUDITORIUM where AUDITORIUM_CAPACITY not between 15 and 60
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
103-4	103-4	90	ЛК
105-4	105-4	90	ЛК
107-4	107-4	90	ЛК
114-4	114-4	90	ЛК-К
132-4	132-4	90	ЛК
229-4	229-4	90	ЛК
304-4	304-4	90	ЛБ-К
314-4	314-4	90	ЛК
320-4	320-4	90	ЛК
408-2	408-2	90	ЛК
423-1	423-1	90	ЛБ-К
429-4	429-4	90	ЛК

WHERE

- IN
- BETWEEN

WHERE BETWEEN

```
select * from AUDITORIUM where AUDITORIUM_CAPACITY between 15 and 60
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
110-4	110-4	30	ЛК
111-4	111-4	30	ЛК
206-1	206-1	15	ЛБ-К
236-1	236-1	60	ЛК
301-1	301-1	15	ЛБ-К
313-1	313-1	60	ЛК
324-1	324-1	50	ЛК
413-1	413-1	15	ЛБ-К

WHERE IN

```
SELECT * FROM AUDITORIUM  
WHERE AUDITORIUM_CAPACITY IN (30, 90);
```

% ◀

Results Messages

AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
103-4	ЛК	90	103-4
105-4	ЛК	90	105-4
107-4	ЛК	90	107-4
110-4	ЛК	30	110-4
111-4	ЛК	30	111-4
114-4	ЛК-К	90	114-4
408-2	ЛК	90	408-2
423-1	ЛБ-К	90	423-1

WHERE IS NULL

```
update AUDITORIUM set AUDITORIUM_NAME = NULL  
where AUDITORIUM_CAPACITY between 15 and 60  
  
select * from AUDITORIUM where AUDITORIUM_NAME IS NULL
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
110-4	NULL	30	ЛК
111-4	NULL	30	ЛК
206-1	NULL	15	ЛБ-К
236-1	NULL	60	ЛК
301-1	NULL	15	ЛБ-К
313-1	NULL	60	ЛК
324-1	NULL	50	ЛК
413-1	NULL	15	ЛБ-К

WHERE IS NULL

```
update AUDITORIUM set AUDITORIUM_NAME = AUDITORIUM  
where AUDITORIUM_NAME IS NULL
```

```
select * from AUDITORIUM where AUDITORIUM_CAPACITY between 15 and 60
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
110-4	110-4	30	ЛК
111-4	111-4	30	ЛК
206-1	206-1	15	ЛБ-К
236-1	236-1	60	ЛК
301-1	301-1	15	ЛБ-К
313-1	313-1	60	ЛК
324-1	324-1	50	ЛК
413-1	413-1	15	ЛБ-К

WHERE IS NULL

```
SELECT * FROM AUDITORIUM  
WHERE AUDITORIUM <> NULL;
```

%

Results Messages

AUDITORIUM	AUDITORIUM_TYPE	AUDITORIUM_CAPACITY	AUDITORIUM_NAME
------------	-----------------	---------------------	-----------------

WHERE LIKE

```
select * from AUDITORIUM_TYPE
```

AUDITORIUM_TYPE	AUDITORIUM_TYPENAME
ЛБ-Х	Химическая лаборатория
ЛБ-К	Компьютерный класс
ЛБ-СК	Спец. компьютерный класс
ЛК	Лекционная
ЛК-К	Лекционная с уст. компьютерами

```
select * from AUDITORIUM_TYPE where AUDITORIUM_TYPENAME like '%КОМП%'
```

AUDITORIUM_TYPE	AUDITORIUM_TYPENAME
ЛБ-К	<u>Компьютерный класс</u>
ЛБ-СК	Спец. <u>компьютерный класс</u>
ЛК-К	Лекционная с уст. <u>компьютерами</u>

```
select * from AUDITORIUM_TYPE where AUDITORIUM_TYPENAME like '%КОМП%КЛ%'
```

AUDITORIUM_TYPE	AUDITORIUM_TYPENAME
ЛБ-К	Компьютерный класс
ЛБ-СК	Спец. компьютерный класс

WHERE LIKE

```
select * from AUDITORIUM_TYPE
```

AUDITORIUM_TYPE	AUDITORIUM_TYPENAME
ЛБ-Х	Химическая лаборатория
ЛБ-К	Компьютерный класс
ЛБ-СК	Спец. компьютерный класс
ЛК	Лекционная
ЛК-К	Лекционная с уст. компьютерами

```
SELECT * FROM AUDITORIUM_TYPE  
WHERE AUDITORIUM_TYPENAME LIKE 'Лекционна%';
```

%

Results Messages

AUDITORIUM_TYPE	AUDITORIUM_TYPENAME
ЛК	Лекционная
ЛК-К	Лекционная с уст. проектором

```
SELECT * FROM AUDITORIUM_TYPE  
WHERE AUDITORIUM_TYPENAME LIKE 'Лекционна_';
```

%

Results Messages

AUDITORIUM_TYPE	AUDITORIUM_TYPENAME
ЛК	Лекционная

WHERE LIKE

```
INSERT INTO AUDITORIUM_TYPE(AUDITORIUM_TYPE,AUDITORIUM_TYPENAME)
VALUES ('%%%', 'Неопиcуемый класс');

SELECT * FROM AUDITORIUM_TYPE
WHERE AUDITORIUM_TYPE LIKE '%[%]%' ;
```

0% ▾

Results

```
AUDITORIUM_TYPE AUDITORIUM_TYPENAME
```

```
-----
%%%
```

(1 row(s) affected)

```
SELECT * FROM AUDITORIUM_TYPE
WHERE AUDITORIUM_TYPE LIKE '[%]' ;
```

% ▾

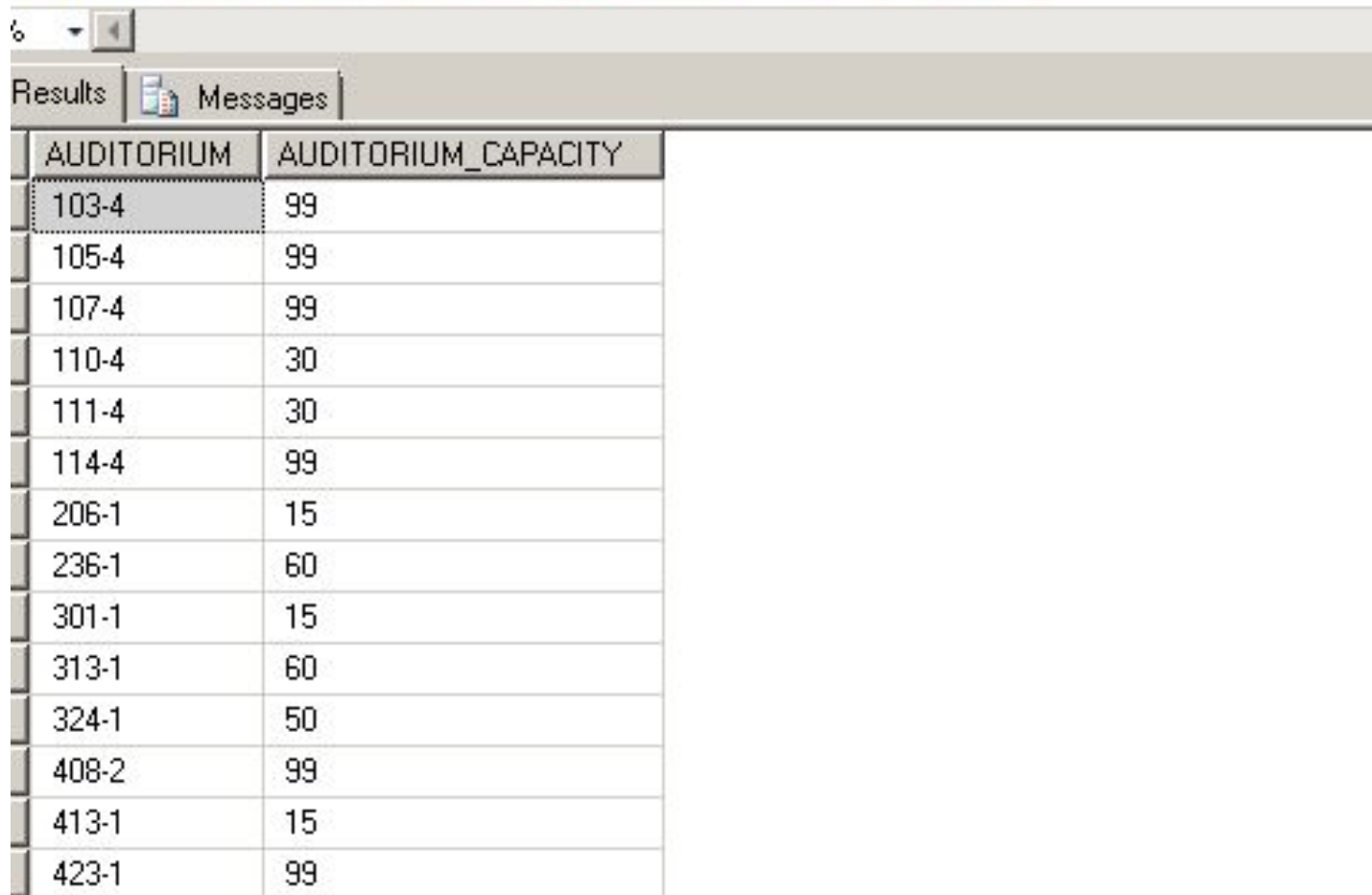
Results

```
AUDITORIUM_TYPE AUDITORIUM_TYPENAME
```

(0 row(s) affected)

WHERE - UPDATE

```
UPDATE AUDITORIUM SET AUDITORIUM_CAPACITY = AUDITORIUM_CAPACITY * 1.1  
WHERE AUDITORIUM_CAPACITY >= 90;  
SELECT AUDITORIUM, AUDITORIUM_CAPACITY FROM AUDITORIUM;
```



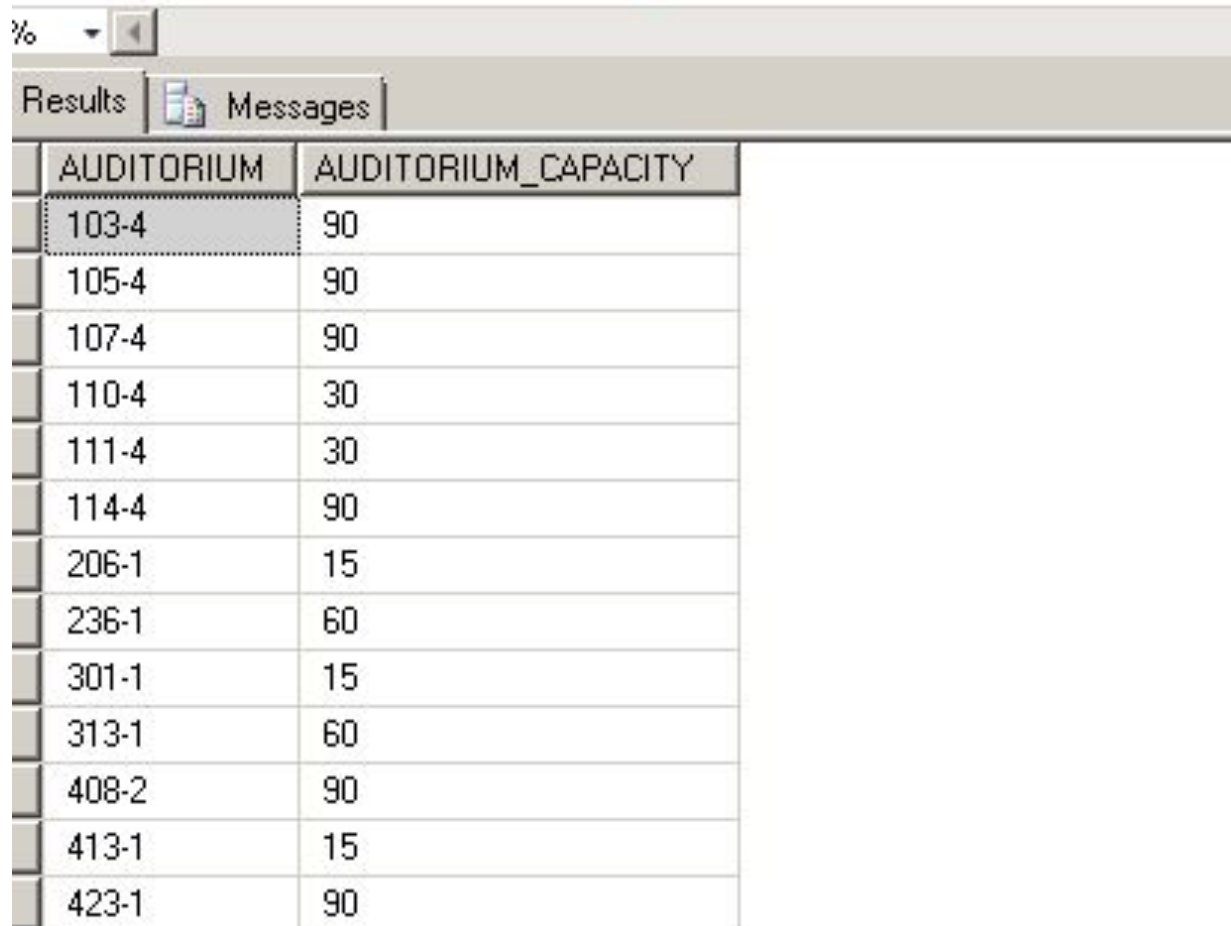
The screenshot shows a database query results window with two tabs: 'Results' and 'Messages'. The 'Results' tab is active, displaying a table with two columns: 'AUDITORIUM' and 'AUDITORIUM_CAPACITY'. The table contains 14 rows of data. The first row, '103-4', is highlighted with a dotted border, indicating it is the current row. The other rows are '105-4', '107-4', '110-4', '111-4', '114-4', '206-1', '236-1', '301-1', '313-1', '324-1', '408-2', '413-1', and '423-1'.

AUDITORIUM	AUDITORIUM_CAPACITY
103-4	99
105-4	99
107-4	99
110-4	30
111-4	30
114-4	99
206-1	15
236-1	60
301-1	15
313-1	60
324-1	50
408-2	99
413-1	15
423-1	99

WHERE - DELETE

```
DELETE FROM AUDITORIUM WHERE AUDITORIUM_CAPACITY = 50;
```

```
SELECT AUDITORIUM, AUDITORIUM_CAPACITY FROM AUDITORIUM;
```



The screenshot shows a SQL query execution window with a toolbar at the top containing a percentage sign and a left arrow. Below the toolbar are two tabs: "Results" (selected) and "Messages". The "Results" tab displays a table with two columns: "AUDITORIUM" and "AUDITORIUM_CAPACITY". The table contains 14 rows of data. The first row, "103-4" with a capacity of "90", is highlighted with a dotted border. The other rows are: "105-4" (90), "107-4" (90), "110-4" (30), "111-4" (30), "114-4" (90), "206-1" (15), "236-1" (60), "301-1" (15), "313-1" (60), "408-2" (90), "413-1" (15), and "423-1" (90).

AUDITORIUM	AUDITORIUM_CAPACITY
103-4	90
105-4	90
107-4	90
110-4	30
111-4	30
114-4	90
206-1	15
236-1	60
301-1	15
313-1	60
408-2	90
413-1	15
423-1	90

GROUP BY

```
select AUDITORIUM_TYPE from AUDITORIUM group by AUDITORIUM_TYPE
```

AUDITORIUM_TYPE
ЛБ-К
ЛК
ЛК-К

```
select AUDITORIUM_TYPE, AUDITORIUM_CAPACITY from AUDITORIUM  
group by AUDITORIUM_TYPE, AUDITORIUM_CAPACITY
```

AUDITORIUM_TYPE	AUDITORIUM_CAPACITY
ЛБ-К	15
ЛБ-К	90
ЛК	30
ЛК	50
ЛК	60
ЛК	90
ЛК-К	90

GROUP BY

- Каждый столбец в списке выборки запроса также должен присутствовать в предложении GROUP BY
- Не распространяется на константы и столбцы, являющиеся частью агрегатной функции
 - MIN
 - MAX
 - SUM
 - AVG
 - COUNT
- Последовательность имен столбцов в GROUP BY не обязательно должна быть такой же, как SELECT

GROUP BY

```
SELECT AUDITORIUM_TYPE,  
       AUDITORIUM_NAME,  
       SUM(AUDITORIUM_CAPACITY) AS [Суммарная вместимость]  
FROM AUDITORIUM  
GROUP BY AUDITORIUM_TYPE;
```

%

Messages

Msg 8120, Level 16, State 1, Line 3

Column 'AUDITORIUM.AUDITORIUM_NAME' is invalid in the select list because it is not contained in either an aggregate function or the GROUP BY clause.

GROUP BY

```
select AUDITORIUM_TYPE, COUNT(*) from AUDITORIUM  
      group by AUDITORIUM_TYPE
```

AUDITORIUM_TYPE	(Отсутствует имя столбца)
ЛБ-К	5
ЛК	16
ЛК-К	1

```
select AUDITORIUM_CAPACITY, COUNT(*) from AUDITORIUM  
      group by AUDITORIUM_CAPACITY
```

AUDITORIUM_CAPACITY	(Отсутствует имя столбца)
15	3
30	2
50	1
60	2
90	14

GROUP BY

```
select SUM(AUDITORIUM_CAPACITY) from AUDITORIUM
```

(Отсутствует имя столбца)

1535

```
SELECT AUDITORIUM_TYPE,  
       SUM(AUDITORIUM_CAPACITY) AS [Суммарная вместимость]  
FROM AUDITORIUM  
GROUP BY AUDITORIUM_TYPE;
```

%

Results



Messages

AUDITORIUM_TYPE	Суммарная вместимость
ЛБ-К	135
ЛК	480
ЛК-К	200

GROUP BY

```
select SUM(AUDITORIUM_CAPACITY) 'сумма',  
MIN(AUDITORIUM_CAPACITY) 'min',  
MAX(AUDITORIUM_CAPACITY) 'max' from AUDITORIUM
```

сумма	min	max
1535	15	90

```
select AUDITORIUM_TYPE, SUM(AUDITORIUM_CAPACITY) 'сумма',  
MIN(AUDITORIUM_CAPACITY) 'min',  
MAX(AUDITORIUM_CAPACITY) 'max'  
  
from AUDITORIUM  
group by AUDITORIUM_TYPE
```

AUDITORIUM_TYPE	сумма	min	max
ЛБ-К	225	15	90
ЛК	1220	30	90
ЛК-К	90	90	90

GROUP BY

```
SELECT AUDITORIUM_TYPE,  
       MIN(AUDITORIUM_CAPACITY) AS [Минимальная вместимость]  
FROM AUDITORIUM  
WHERE AUDITORIUM_CAPACITY >30  
GROUP BY AUDITORIUM_TYPE;
```

AUDITORIUM_TYPE	Минимальная вместимость
ЛБ-К	90
ЛК	60
ЛК-К	50

HAVING

- В предложении HAVING определяется условие, которое применяется к группе строк.
- Синтаксис:
- *HAVING condition*

```
SELECT AUDITORIUM_TYPE,  
       COUNT(AUDITORIUM_CAPACITY) AS [Количество]  
FROM AUDITORIUM  
GROUP BY AUDITORIUM_TYPE;
```

AUDITORIUM_TYPE	Количество
ЛБ-К	4
ЛК	7
ЛК-К	3

```
SELECT AUDITORIUM_TYPE,  
       COUNT(AUDITORIUM_CAPACITY) AS [Количество]  
FROM AUDITORIUM  
GROUP BY AUDITORIUM_TYPE  
HAVING COUNT(AUDITORIUM_CAPACITY) > 3;
```

AUDITORIUM_TYPE	Количество
ЛБ-К	4
ЛК	7

HAVING

```
SELECT AUDITORIUM_TYPE  
FROM AUDITORIUM  
GROUP BY AUDITORIUM_TYPE  
HAVING AUDITORIUM_TYPE = 'ЛБ-К';
```

%

Results Messages

AUDITORIUM_TYPE
ЛБ-К

DISTINCT

```
select AUDITORIUM_CAPACITY from AUDITORIUM
```

AUDITORIUM_CAPACITY
90
90
90
90
90
30
30
90
90
15
90
60
15
90
60
90
90
50
90

```
select distinct AUDITORIUM_CAPACITY from AUDITORIUM
```

AUDITORIUM_CAPACITY
15
30
50
60
90

ORDER BY

```
select * from AUDITORIUM order by AUDITORIUM asc
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
?	???	90	ЛК
025-4	025-4	90	ЛК
103-4	103-4	90	ЛК
105-4	105-4	90	ЛК
107-4	107-4	90	ЛК
110-4	110-4	30	ЛК
111-4	111-4	30	ЛК
114-4	114-4	90	ЛК-К
132-4	132-4	90	ЛК
206-1	206-1	15	ЛБ-К
229-4	229-4	90	ЛК
236-1	236-1	60	ЛК
301-1	301-1	15	ЛБ-К
304-4	304-4	90	ЛБ-К
313-1	313-1	60	ЛК
314-4	314-4	90	ЛК
320-4	320-4	90	ЛК
324-1	324-1	50	ЛК
408-2	408-2	90	ЛК
413-1	413-1	15	ЛБ-К

ORDER BY

```
select * from AUDITORIUM order by AUDITORIUM desc
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
429-4	429-4	90	ЛК
423-1	423-1	90	ЛБ-К
413-1	413-1	15	ЛБ-К
408-2	408-2	90	ЛК
324-1	324-1	50	ЛК
320-4	320-4	90	ЛК
314-4	314-4	90	ЛК
313-1	313-1	60	ЛК
304-4	304-4	90	ЛБ-К
301-1	301-1	15	ЛБ-К
236-1	236-1	60	ЛК
229-4	229-4	90	ЛК
206-1	206-1	15	ЛБ-К
132-4	132-4	90	ЛК
114-4	114-4	90	ЛК-К
111-4	111-4	30	ЛК
110-4	110-4	30	ЛК
107-4	107-4	90	ЛК
105-4	105-4	90	ЛК
102-4	102-4	90	ЛК

ORDER BY

```
select * from AUDITORIUM order by AUDITORIUM_CAPACITY desc,  
AUDITORIUM_TYPE asc
```

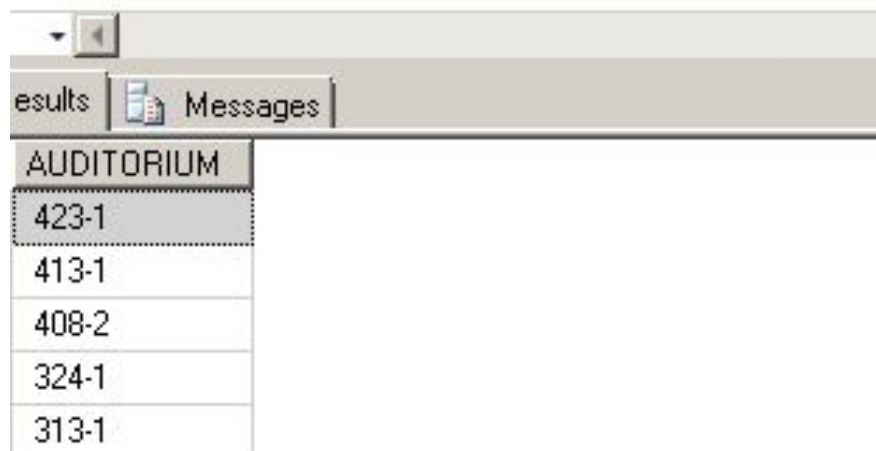
AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
304-4	304-4	90	ЛБ-К
423-1	423-1	90	ЛБ-К
429-4	429-4	90	ЛК
408-2	408-2	90	ЛК
314-4	314-4	90	ЛК
320-4	320-4	90	ЛК
?	???	90	ЛК
025-4	025-4	90	ЛК
103-4	103-4	90	ЛК
105-4	105-4	90	ЛК
107-4	107-4	90	ЛК
132-4	132-4	90	ЛК
229-4	229-4	90	ЛК
114-4	114-4	90	ЛК-К
236-1	236-1	60	ЛК
313-1	313-1	60	ЛК
324-1	324-1	50	ЛК
110-4	110-4	30	ЛК
111-4	111-4	30	ЛК

TOP

```
select top 5 * from AUDITORIUM
```

AUDITORIUM	AUDITORIUM_NAME	AUDITORIUM_CAPACITY	AUDITORIUM_TYPE
?	???	90	ЛК
026-4	026-4	90	ЛК
103-4	103-4	90	ЛК
105-4	105-4	90	ЛК
107-4	107-4	90	ЛК

```
SELECT TOP 5 AUDITORIUM FROM AUDITORIUM  
ORDER BY AUDITORIUM DESC;
```



The screenshot shows a software interface with a tab labeled 'results' and a 'Messages' icon. Below the tab is a table with the following data:

AUDITORIUM
423-1
413-1
408-2
324-1
313-1

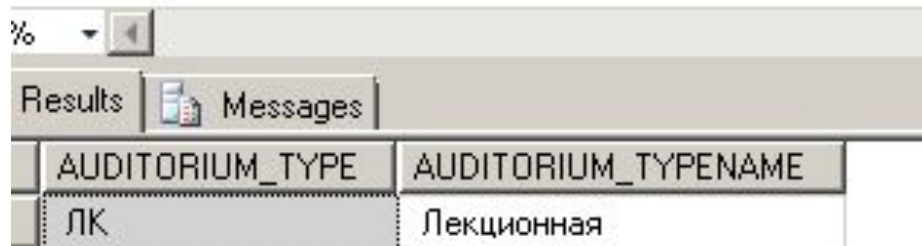
INTO

```
SELECT
    AUDITORIUM_TYPE,
    AUDITORIUM_TYPENAME
INTO AUD_TYPE
FROM AUDITORIUM_TYPE
WHERE AUDITORIUM_TYPE = 'ЛК';
```



(1 row(s) affected)

```
SELECT * FROM AUD_TYPE;
```



A screenshot of a SQL query execution window. The top part shows a dropdown menu with '%' and a left arrow button. Below it are two tabs: 'Results' and 'Messages'. The 'Results' tab is active and displays a table with two columns: 'AUDITORIUM_TYPE' and 'AUDITORIUM_TYPENAME'. The table contains one row of data.

AUDITORIUM_TYPE	AUDITORIUM_TYPENAME
ЛК	Лекционная

Временные таблицы

- Временные таблицы создаются для временного хранения результатов SELECT-запросов
- Локальные временные таблицы
 - имена, начинаются с символа #
 - доступны только пользователю, ее создавшему
 - автоматически удаляется при отключении пользователя
- Глобальные временные таблицы
 - имена, начинаются с символов ##,
 - доступны всем пользователям, подключенным к серверу

Временные таблицы

```
create table #TEACHER
(
  TEACHER          char(10)
                  constraint [T_TEACHER_PK] primary key,
  TEACHER_NAME    varchar(100) default '???' ,
  GENDER          char(1) default 'м'
                  constraint [T_TEACHER_GENDER_CH] check (GENDER in ('м', 'ж')),
  PULPIT          char(20)
);
go
insert into #TEACHER (TEACHER, TEACHER_NAME, PULPIT )
  values ('СМЛВ', 'Смелов Владимир Владиславович', 'ИСИТ'),
         ('АКНВЧ', default, 'ИСИТ'),
         ('КЛСНВ', null, 'ИСИТ'),
         ('ГРМН', 'Герман Олег Витольдович', 'ИСИТ'),
         ('ЛЩНК', 'Лашенко Анатолий Павлович', 'ИСИТ');
update #TEACHER set TEACHER_NAME = TEACHER where TEACHER_NAME = '???' ;
delete #TEACHER where TEACHER_NAME is null;
select * from #TEACHER;
drop table #TEACHER;
```

Вопросы?